Supporting Information

Ultrasensitive and Stretchable Resistive Strain Sensors Designed for Wearable Electronics

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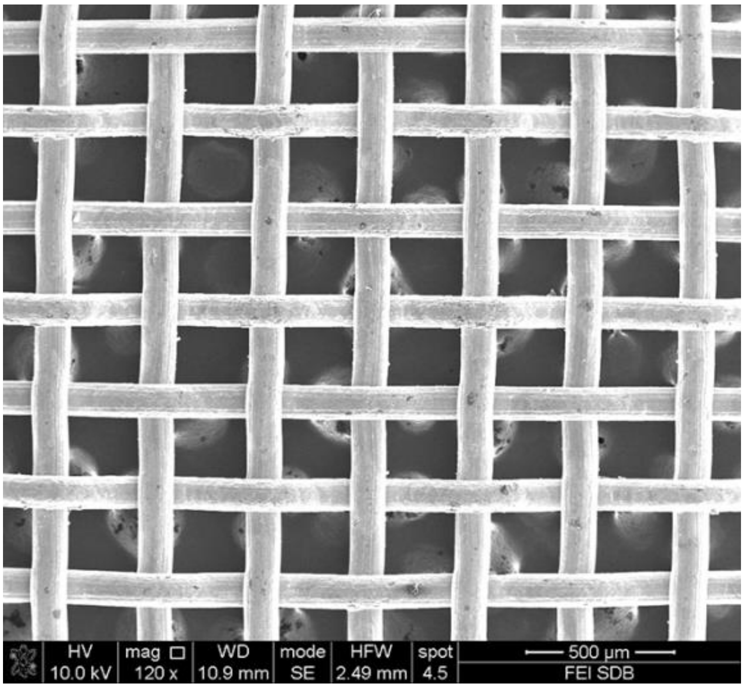

Fig. S1. SEM image of a piece of steel net. It can be observed that the steel lines are parallel to each other, and regular.

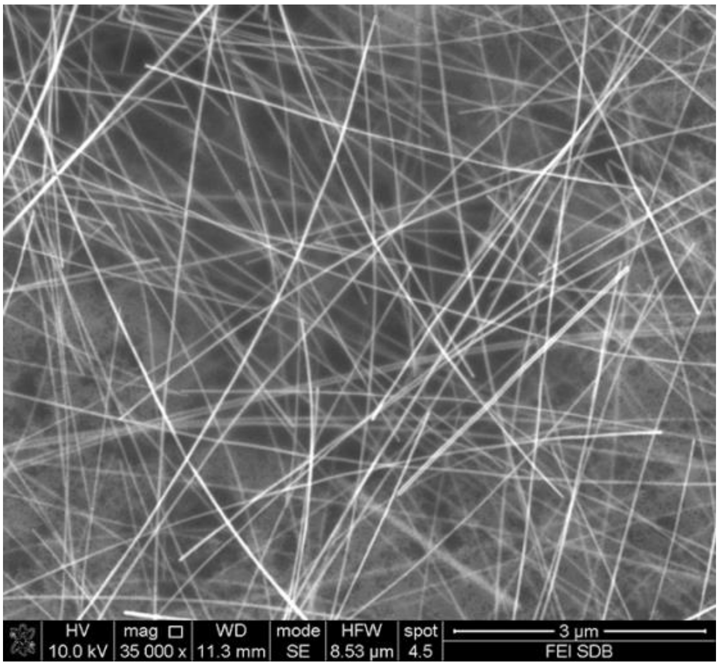

Fig. S2. SEM image of Ag NWs. It can be observed that the Ag NWs possesses large length-diameter ratio. It is helpful to the formation of a good percolating conductive path.

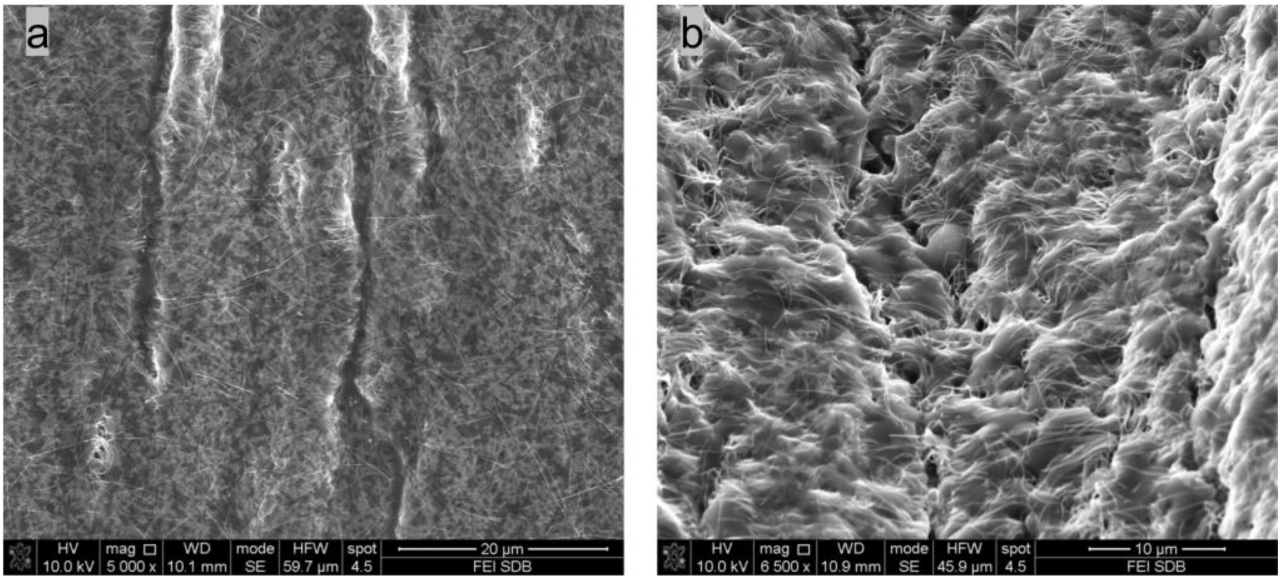

Fig. S3. SEM images of (**a**) square plat and (**b**) concave line of Ag NWs@P-PDMS. It can be observed that plenty of microcracks widely exists in the surface of the P-PDMS no matter onside the square plats and inside parallel concave lines.

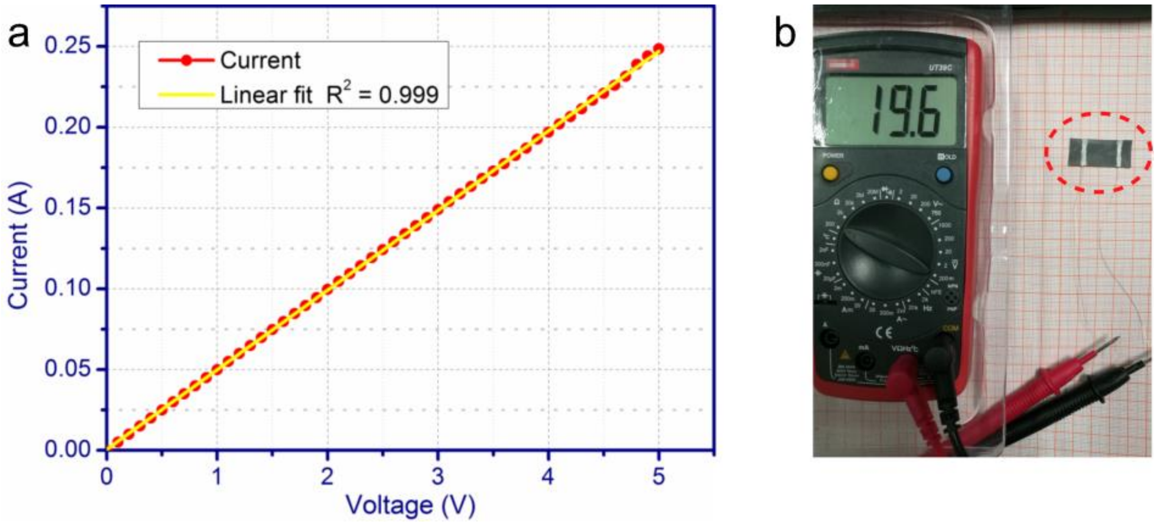

Fig. S4. (**a**) Typical current-voltage characteristic of the strain sensor. (**b**) The original electrical resistance of the strain sensor. From the two measurements, it can be known that the original resistance of the strain sensor is relatively low.

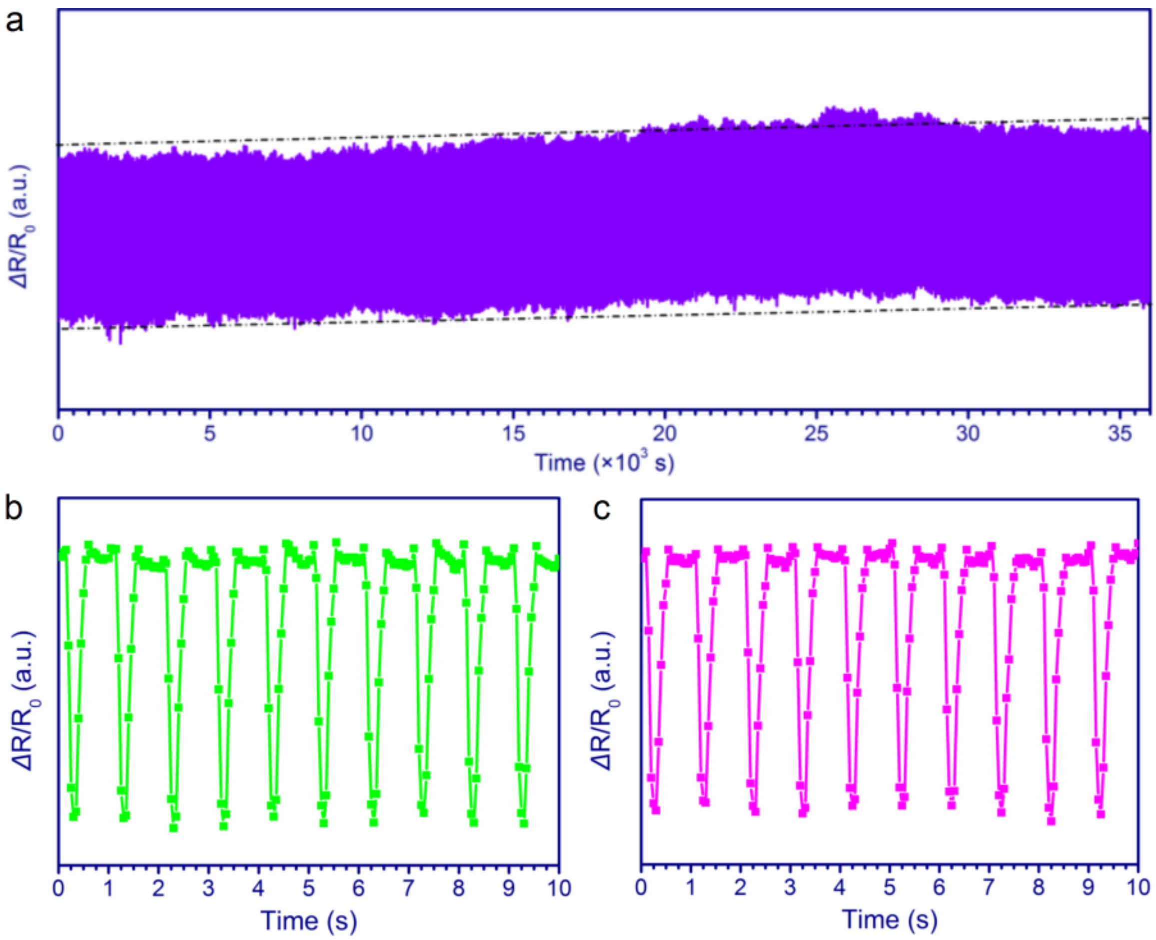

Fig. S5. (**a**) Variations in resistance of the strain sensor for > 35 000 strain loading-unloading cycles from 5% to 25% at the stretching frequency of 1 Hz. (**b**) The continuous strain responses at the time of the first ten seconds (**c**) The relative resistance changes of the strain sensor to the applied strain after 35 000 strain loading-unloading cycles.

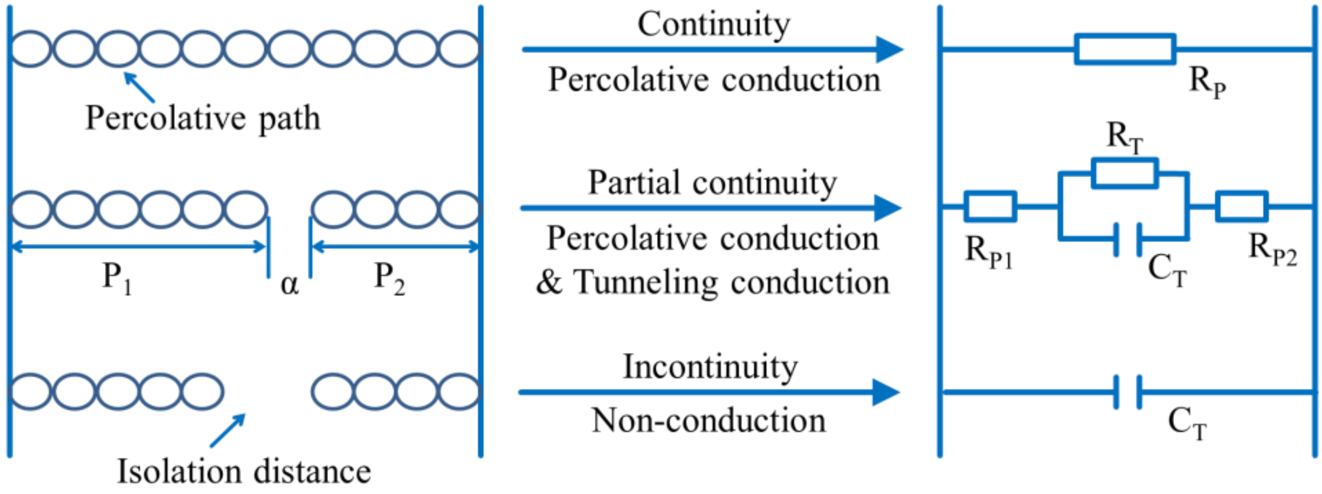

Fig. S6. The models and analog circuits of three internal structures of Ag NWs@P-PDMS.

We classified internal structures of Ag NWs@P-PDMS, surface conductive composite polymers, into three types depending on isolation distance of each percolative path: (I) complete continuity with no isolation distance, (II) partial continuity with a certain isolation distance, (III) complete disconnection between each percolative path. Correspondingly, the conductive strategies are based on percolative conduction, percolative conduction with tunneling conduction, and non-condiction. In this way, the total resistance R_{total} can be calculated by using Kirchhoff's circuit law and Ohm's law, which are $R_{total} = \sum R_P$ (S1), $R_{total} = \sum(R_P + R_T)$ (S2) and $R_{total} \rightarrow \infty$ (S3), respectively, where R_P is the resistance of percative path, R_T is the tunneling resistance.

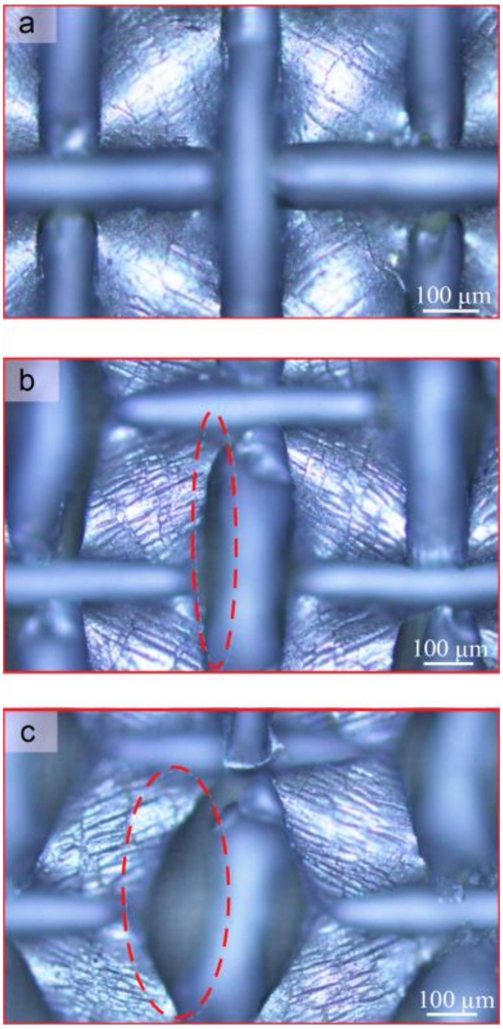

Fig. S7. The SEM images of the strain sensor (**a**) without or with (**b**) small and (**c**) large applied strain. The SEM images are the original ones of Figure 5.

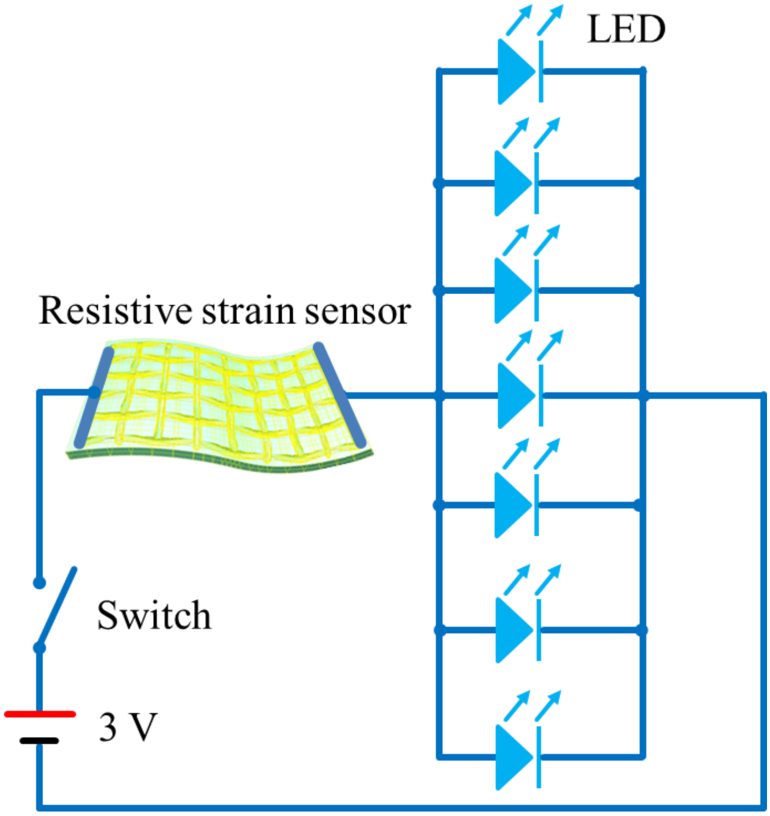

Fig. S8. The series-parallel circuit of the control system of a LED indicator. Through a simple arrangement and layout, the LEDs can be formed to be a LED indicator just like Figure 6.

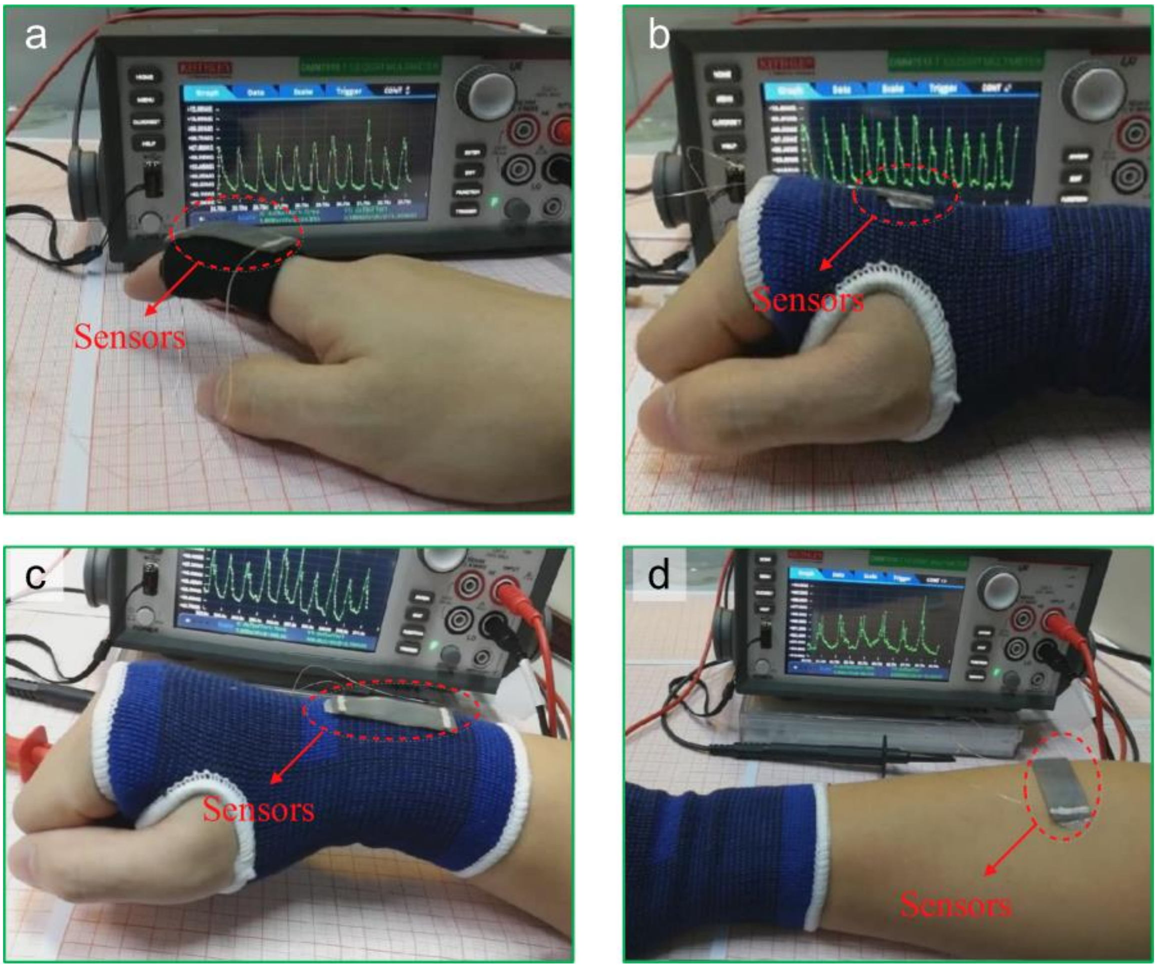

Fig. S9. Photographs of the movie clip for the application of (**a**) smart fingerstall, (**b**) smart hand protector, (**c**) functional wrister and (**d**) electronic skin.